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Hat Creek-White River Drainage Basin Hydrogeologic Summary from *Domestic Well-water Quality in Rural Nebraska*

(A data-analysis report for the Nebraska Department of Health compiled by D. C. Gosselin and others, 1996)

Groundwater Region 13

Groundwater Region 13 is located in the northern part of Nebraska's Panhandle. The area is characterized by a lack of any substantial groundwater resource (fig. 1). The Pierre shale crops out at the surface or is present at shallow depth in much of the northern part of this area. It is a black marine shale of Cretaceous age and ranges in thickness from 0 to about 5,000 feet or more. This impermeable shale does not yield sufficient quantities of water for domestic or livestock use. Groundwater developed in the northern part of this region is limited to a few isolated low-yield wells drilled into river-deposited sediments along the major drainages. In the areas underlain by the Pierre shale, water is piped many miles for domestic or livestock use.

The Tertiary White River Group underlies the southern part of region 13 and has been locally developed as a source of groundwater (table 1). This group consists of the Chadron and the Brule formations. The Chadron Formation consists of a basal sand unit that ranges in thickness from 0 to 350 feet. It is overlain by as much as 150 feet of bentonitic mudstones. The Brule Formation (130 feet to 530 feet thick) consists of interbedded siltstone and mudstones with isolated channels of arkosic sands. The Brule Formation yields groundwater from channel sands. The sands near the bottom of the Chadron Formation yield sodium-sulphate water with high total dissolved solids. Near uranium deposits in the Crawford area, groundwater from the Chadron Formation is not suitable for domestic or livestock purposes because of high radium concentrations.

***Cross sections for other regions of the state (fig. 1—Locations of geologic cross sections) are available from the Conservation and Survey Division for a small fee. The report *Domestic Well-water quality in Rural Nebraska* is available from the Nebraska Department of Health and Human Services. Photocopies are available at CSD; write: Map and Publications Sales/Conservation and Survey Division/113 Nebraska Hall/University of Nebraska-Lincoln/68588-0517; or call: (402) 472-7523.**

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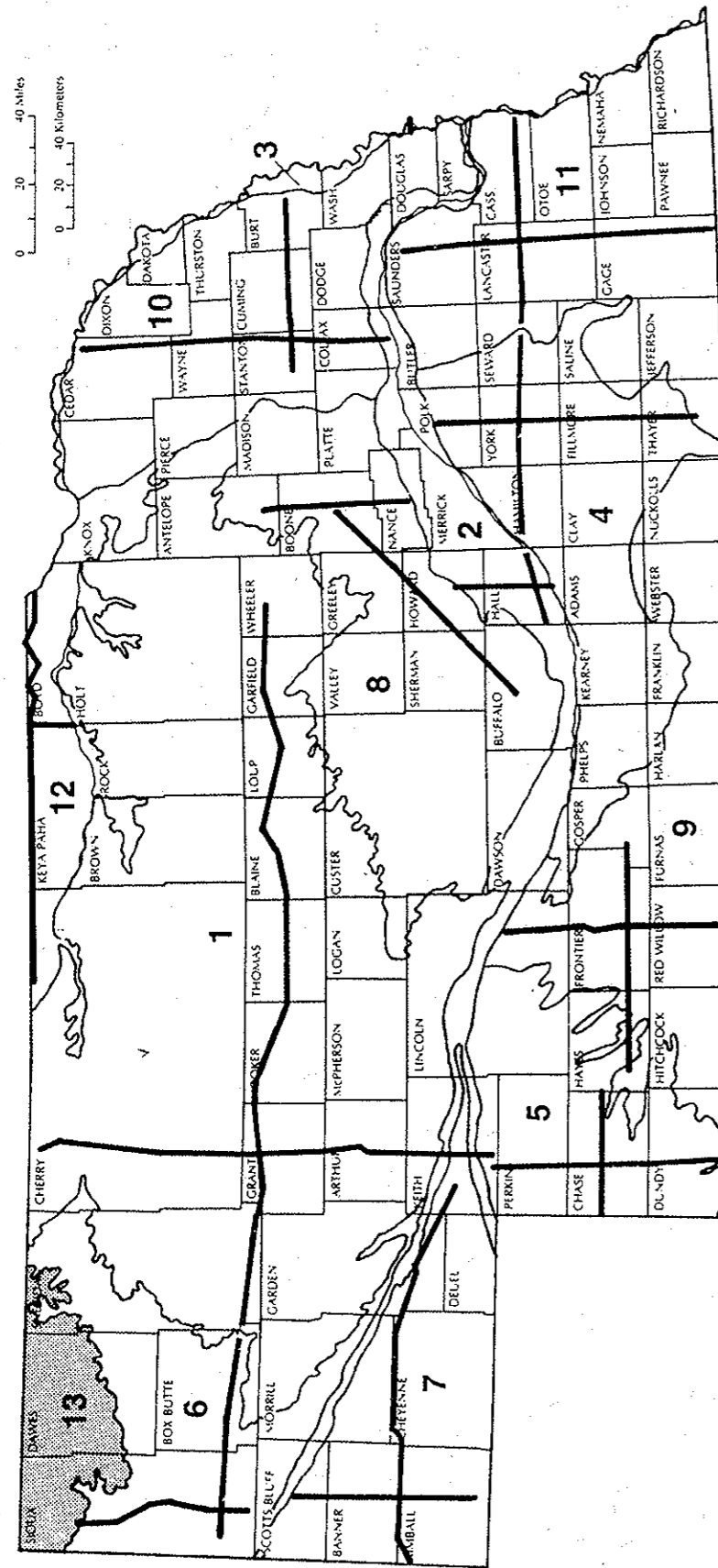


Fig. 1—Locations of geologic cross sections (Region 13 in gray)

Water-bearing Properties of Major Rock Units in Nebraska						
From <i>The Groundwater Atlas of Nebraska</i> Conservation and Survey Division, University of Nebraska-Lincoln						
Era	Period	Epoch	Millions of years	Group or Formation	Lithology	Water-bearing Properties
Cenozoic	Quaternary	Holocene	0.01		Sand, silt, gravel and clay	Principal groundwater reservoir; Ogallala is absent in east and northwest. Arikaree is present primarily in west.
		Pleistocene	~2.0			
	Oligocene	Pliocene	5	Ogallala	Sand, gravel and silt	
		Miocene	24	Arikaree	Sand, sandstone, siltstone and some gravel	
		White River			Sandstone and siltstone	
	Eocene	37				
	Paleocene	58				
Mesozoic	Cretaceous	Late Cretaceous	67	Lance	Sandstone and siltstone	Generally not an aquifer; yields water to few wells in west.
				Fox Hills		
			Pierre	Shale and some sandstone in west	Generally not an aquifer; sandstones in west yield highly mineralized water to few industrial wells.	
			Niobrara	Shaly chalk and limestone	Secondary aquifer where fractured and at shallow depths, primarily in east.	
			Carlile	Shale; in some areas contains sandstones in upper part	Generally not an aquifer; sandstones yield water to few wells in northeast.	
			Greenhorn-Graneros	Limestone and shale	Generally not an aquifer; yields water to few wells in east.	
		Early Cretaceous	98	Dakota	Sandstone and shale	Secondary aquifer, primarily in east; water may be highly mineralized.
		Jurassic	144		Siltstone and some sandstone	Not an aquifer
		Triassic	208		Siltstone	Not an aquifer
	Paleozoic	Permian	245			Limestone, dolomites, shales and sandstone.
Pennsylvanian		286				
Mississippian		320				
Devonian		360				
Silurian		408				
Ordovician		438				
Cambrian		505				
Precambrian	570					

Table 1—Hydrostratigraphic chart (showing water-bearing rock units) of Nebraska
Time divisions are not to scale.

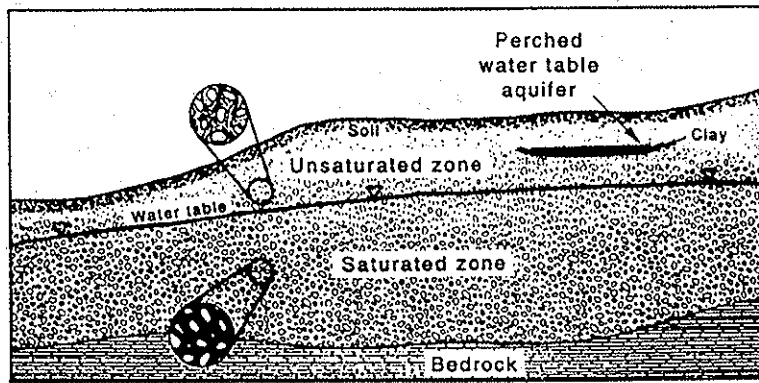
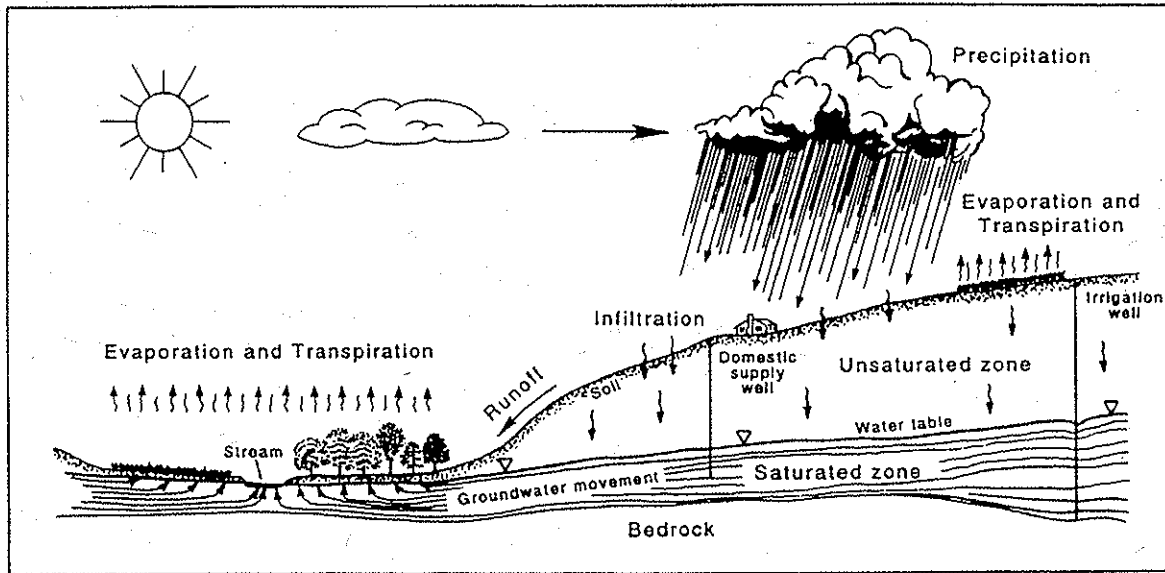


Fig. 2—Groundwater cycle and idealized cross section